

ABSTRACT

A method and apparatus for detecting radiation including x-ray, gamma ray, and particle radiation for radiographic imaging, and nuclear medicine and x-ray mammography in particular, and material composition analysis are described. A detection system employs fixed or configurable arrays of one or more detector modules comprising detector arrays that may be electronically manipulated through a computer system. The detection system, by providing the ability for electronic manipulation, permits adaptive imaging. Detector array configurations include familiar geometries, including slit, slot, plane, open box, and ring configurations, and customized configurations, including wearable detector arrays, that are customized to the shape of the patient. Conventional, such as attenuating, rigid geometry, and unconventional collimators, such as x-ray optic, configurable, Compton scatter modules, can be selectively employed with detector modules and radiation sources. Novel Compton gamma camera designs can be implemented. Edge-on detector resolution may be enhanced by measuring the interaction location along the height of the aperture. Edge-on detectors may be irradiated from the side. The components of the imaging chain can be calibrated or corrected using processes of the invention. X-ray mammography and scintimammography are enhanced by utilizing sectional compression and related imaging techniques.